

Geometry Honors - Algebra Review

Solving Linear Equations

1. $2x + 5 = 11$

$$2x = 6$$

$$x = 3$$

4. $x - 3(x - 7) = 4(x - 7) - 2x$

$$x - 3x + 21 = 4x - 28 - 2x$$

$$-2x + 21 = 2x - 28$$

$$-4x = -49$$

$$x = 49/4$$

2. $2(x - 3) = 84$

$$2x - 6 = 84$$

$$2x = 90$$

$$x = 45$$

5. $-\frac{x}{8} + 7 = 5$

$$-\frac{x}{8} = -2$$

$$x = 16$$

3. $3x - 4(x - 4) + 4 = 13$

$$3x - 4x + 16 + 4 = 13$$

$$-x + 20 = 13$$

$$-x = -7$$

$$x = 7$$

6. $12x + 8 = 6x - 5$

$$6x = -13$$

$$x = -13/6$$

Solving Inequalities

7. $4c + 23 \leq -13$

$$4c \leq -36$$

$$c \leq -9$$

10. $\frac{8}{3}x + 1 > -5$

$$\frac{8}{3}x > -6$$

$$x > -9/4$$

8. $\frac{a}{11} \geq 8$

$$a \geq 88$$

11. $7q + 3 \geq -4q + 25$

$$11q \geq 22$$

$$q \geq 2$$

9. $-3b < 48$

$$b > -16$$

12. $-3w + 1 \leq 8$

$$-3w \leq 7$$

$$w \geq -7/3$$

Solving Systems of Equations using Elimination

$$\begin{array}{l} 13. \quad 2x - 3y = 2 \rightarrow -2x + 3y = -2 \\ \quad \quad 5x - 3y = 14 \quad + \quad 5x - 3y = 14 \\ \quad \quad \quad \quad \quad 3x = 12 \\ \quad \quad \quad \quad \quad x = 4 \\ \quad \quad \quad \quad \quad (4, 2) \end{array} \quad \begin{array}{l} 2(4) - 3y = 2 \\ 8 - 3y = 2 \\ -3y = -6 \\ y = 2 \end{array}$$

$$\begin{array}{l} 14. \quad x - y = 39 \\ \quad + \quad x + y = 1785 \\ \quad \quad 2x = 1824 \\ \quad \quad x = 912 \end{array} \quad \begin{array}{l} 912 + y = 1785 \\ y = 873 \\ (912, 873) \end{array}$$

$$\begin{array}{l} 15. \quad 11x - 3y = -39 \rightarrow 44x - 12y = -156 \\ \quad \quad 6x + 12y = -19 \quad + \quad 6x + 12y = -19 \\ \quad \quad \quad \quad \quad 50x = -175 \\ \quad \quad \quad \quad \quad x = -3\frac{1}{2} \\ \quad \quad \quad \quad \quad (-3\frac{1}{2}, \frac{1}{6}) \end{array} \quad \begin{array}{l} 6(-3\frac{1}{2}) + 12y = -19 \\ -21 + 12y = -19 \\ 12y = 2 \\ y = \frac{1}{6} \end{array}$$

$$\begin{array}{l} 16. \quad 2y - 3x = 51 \rightarrow -3x + 2y = 51 \rightarrow -21x + 14y = 357 \\ \quad \quad 11x - 7y = -187 \quad + \quad 11x - 7y = -187 \quad + \quad 22x - 14y = -374 \\ \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad x = -17 \end{array}$$

$$\begin{array}{l} 2y - 3(-17) = 51 \\ 2y + 51 = 51 \\ 2y = 0 \\ y = 0 \end{array} \quad (-17, 0)$$

Solving Systems of Equations using Substitution

17. $2x + y = 21 \rightarrow y = -2x + 21$
 $7x - 2y = 90$

$$7x - 2(-2x + 21) = 90$$

$$7x + 4x - 42 = 90$$

$$11x - 42 = 90$$

$$11x = 132$$

$$x = 12$$

$$y = -2(12) + 21$$

$$= -24 + 21$$

$$= -3$$

$$(12, -3)$$

18. $2x + 7y = -20$

$$x - 5y = -10 \rightarrow x = 5y - 10$$

$$2(5y - 10) + 7y = -20$$

$$10y - 20 + 7y = -20$$

$$17y - 20 = -20$$

$$17y = 0$$

$$y = 0$$

$$x = 5(0) - 10$$

$$= 0 - 10$$

$$= -10$$

$$(-10, 0)$$

19. $2x - 4y = 40 \rightarrow 2x = 4y + 40$

$$8x - 3y = 82$$

$$x = 2y + 20$$

$$8(2y + 20) - 3y = 82$$

$$16y + 160 - 3y = 82$$

$$13y + 160 = 82$$

$$13y = -78$$

$$y = -6$$

$$x = 2(-6) + 20$$

$$= -12 + 20$$

$$= 8$$

$$(8, -6)$$

$$\begin{array}{l} 20. \quad 2x + 3y = 8 \rightarrow 2x = 8 - 3y \\ \quad \quad 9x - 3y = 14 \quad \quad x = 4 - \frac{3}{2}y \end{array}$$

$$\begin{array}{l} 9(4 - \frac{3}{2}y) - 3y = 14 \quad \quad x = 4 - \frac{3}{2}(\frac{4}{3}) \\ 36 - \frac{27}{2}y - 3y = 14 \quad \quad = 4 - 2 \\ 36 - \frac{33}{2}y = 14 \quad \quad = 2 \\ -\frac{33}{2}y = -22 \\ -33y = -44 \quad \quad (2, \frac{4}{3}) \\ y = \frac{4}{3} \end{array}$$

Simplifying Radicals

$$21. \quad \sqrt{80} = \sqrt{16} \cdot \sqrt{5} = 4\sqrt{5}$$

$$22. \quad \sqrt{243} = \sqrt{81} \cdot \sqrt{3} = 9\sqrt{3}$$

$$23. \quad \sqrt{40} = \sqrt{4} \cdot \sqrt{10} = 2\sqrt{10}$$

$$24. \quad \sqrt{675} = \sqrt{25} \cdot \sqrt{9} \cdot \sqrt{3} = 5 \cdot 3 \cdot \sqrt{3} = 15\sqrt{3}$$

$$25. \quad \sqrt{50} \cdot \sqrt{10} = \sqrt{500} = \sqrt{100} \cdot \sqrt{5} = 10\sqrt{5}$$

$$26. \quad \sqrt{6} \cdot \sqrt{6} = \sqrt{36} = 6$$

$$27. \quad \sqrt{98x^3y^6} = \sqrt{49} \cdot \sqrt{2} \cdot \sqrt{x^3y^6} = 7xy^3\sqrt{2x}$$

$$28. \quad \sqrt{56a^2b^4c^5} = \sqrt{4} \cdot \sqrt{14} \cdot \sqrt{a^2b^4c^5} = 2ab^2c^2\sqrt{14c}$$

$$29. \quad \sqrt{\frac{63}{8}} = \frac{\sqrt{63}}{\sqrt{8}} = \frac{\sqrt{9 \cdot 7}}{\sqrt{4 \cdot 2}} = \frac{3\sqrt{7}}{2\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{3\sqrt{14}}{4}$$

Solving Equations using Quadratic Formula

30. $x^2 + 5x + 4 = 0$

$$x = \frac{-5 \pm \sqrt{5^2 - 4(1)(4)}}{2(1)} = \frac{-5 \pm \sqrt{25 - 16}}{2} = \frac{-5 \pm \sqrt{9}}{2}$$

$$= \frac{-5 \pm 3}{2} \rightarrow \frac{-5+3}{2} = \frac{-2}{2} = -1$$

$$\rightarrow \frac{-5-3}{2} = \frac{-8}{2} = -4$$

$$x = \{-1, -4\}$$

31. $x^2 - x = 6$

$$x^2 - x - 6 = 0$$

$$x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(-6)}}{2(1)} = \frac{1 \pm \sqrt{1+24}}{2} = \frac{1 \pm \sqrt{25}}{2}$$

$$= \frac{1 \pm 5}{2} \rightarrow \frac{1+5}{2} = \frac{6}{2} = 3$$

$$\rightarrow \frac{1-5}{2} = \frac{-4}{2} = -2$$

$$x = \{-2, 3\}$$

32. $4x^2 + 8x + 2 = 0$

$$x = \frac{-8 \pm \sqrt{(8)^2 - 4(4)(2)}}{2(4)} = \frac{-8 \pm \sqrt{64 - 32}}{8} = \frac{-8 \pm \sqrt{32}}{8}$$

$$= \frac{-8 \pm 5.66}{8} \rightarrow \frac{-8+5.66}{8} = -.29$$

$$\rightarrow \frac{-8-5.66}{8} = -1.71$$

$$x = \{-1.71, -.29\}$$

33. $-8x + 3x^2 = -1$

$$3x^2 - 8x + 1 = 0$$

$$x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(3)(1)}}{2(3)} = \frac{8 \pm \sqrt{64 - 12}}{6} = \frac{8 \pm \sqrt{52}}{6}$$

$$= \frac{8 \pm 7.21}{6} \rightarrow \frac{8+7.21}{6} = 2.54$$

$$\rightarrow \frac{8-7.21}{6} = .13$$

$$x = \{.13, 2.54\}$$

Solving Equations by Factoring

34. $x^2 - 10x - 24 = 0$

$$(x-12)(x+2) = 0$$

$$x-12=0 \quad x+2=0$$

$$x=12 \quad x=-2$$

37. $24x - 35 = 4x^2$

$$4x^2 - 24x + 35 = 0$$

$$(2x-7)(2x-5) = 0$$

$$2x-7=0 \quad 2x-5=0$$

$$x=7/2 \quad x=5/2$$

35. $x^2 = 2x + 48$

$$x^2 - 2x - 48 = 0$$

$$(x-8)(x+6) = 0$$

$$x-8=0 \quad x+6=0$$

$$x=8 \quad x=-6$$

38. $-9x^2 + 15x = 4$

$$9x^2 - 15x + 4 = 0$$

$$(3x-4)(3x-1) = 0$$

$$3x-4=0 \quad 3x-1=0$$

$$x=4/3 \quad x=1/3$$

36. $x^2 - 9x = 2x + 12$

$$x^2 - 11x - 12 = 0$$

$$(x-12)(x+1) = 0$$

$$x-12=0 \quad x+1=0$$

$$x=12 \quad x=-1$$

39. $6x^2 = 2(13x + 10)$

$$3x^2 = 13x + 10$$

$$3x^2 - 13x - 10 = 0$$

$$(3x-10)(x+1) = 0$$

$$3x-10=0 \quad x+1=0$$

$$x=10/3 \quad x=-1$$

Multiplying Polynomials

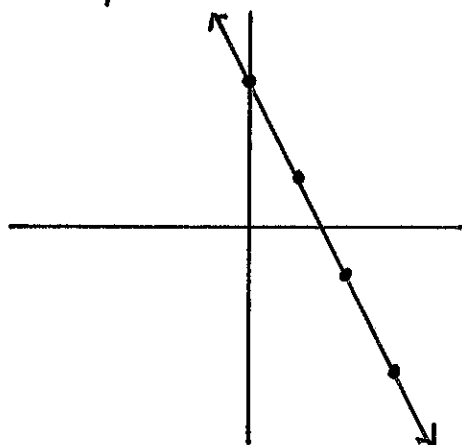
40. $(9/2x)(8x^5) = 36x^6$

41. $8y^2(5y^3 - 2y + 1) = 40y^5 - 16y^3 + 8y^2$

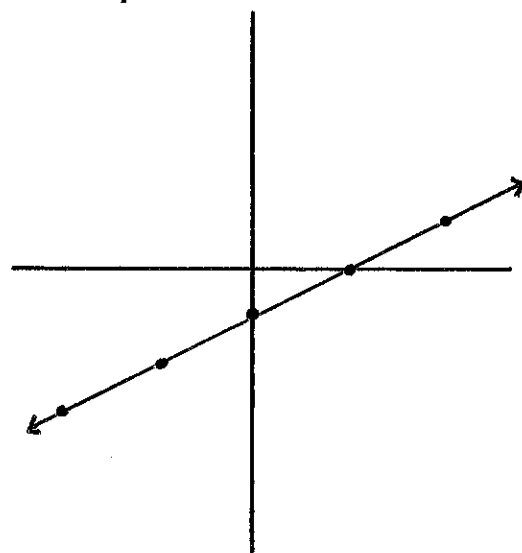
42. $(a+3)(a-6) = a^2 - 6a + 3a - 18 = a^2 - 3a - 18$

43. $(t + 8/3)^2 = (t + 8/3)(t + 8/3) = t^2 + 8/3t + 8/3t + 64/9$
 $= t^2 + 16/3t + 64/9$

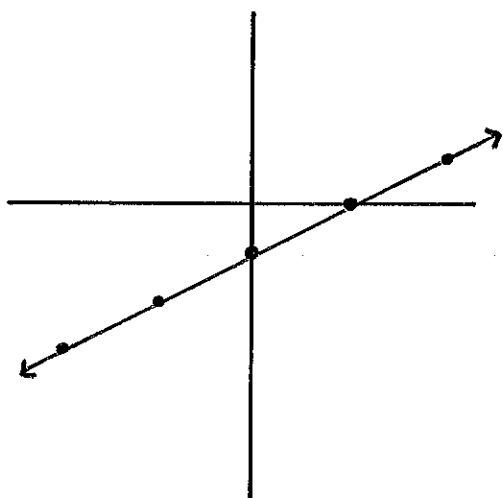
44. $y = -2x + 3$



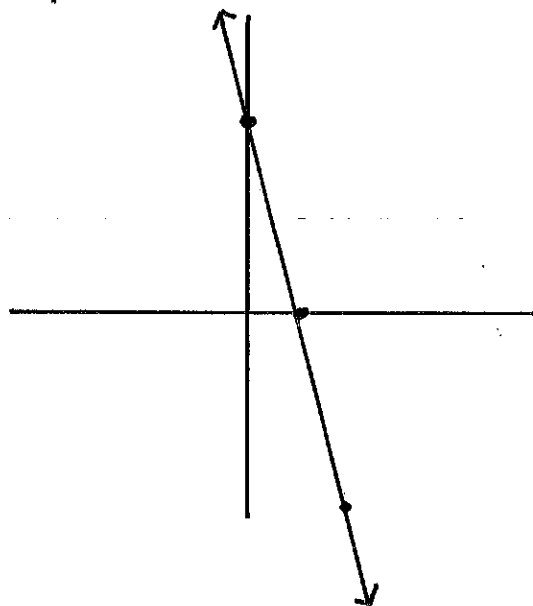
46. $2y - x = -2$
 $2y = x - 2$
 $y = \frac{1}{2}x - 1$



45. $y = \frac{1}{2}x - 1$



47. $4x + y = 4$
 $y = -4x + 4$



Writing Equations of Lines

48. $m = -4$, $(0, 3)$ y -int
 $y = -4x + 3$

49. $m = 2/3$, $(5, -7)$

$$y = mx + b$$

$$-7 = (2/3)(5) + b$$

$$-7 = 10/3 + b$$

$$-31/3 = b$$

$$y = 2/3x - 31/3$$

50. $(-5, -3)$, $(10, -6)$

$$m = \frac{-6 - (-3)}{10 - (-5)} = \frac{-6 + 3}{10 + 5} = \frac{-3}{15} = \frac{-1}{5}$$

$$y = mx + b$$

$$-3 = (-1/5)(-5) + b$$

$$-3 = 1 + b$$

$$-4 = b$$

$$y = -1/5x - 4$$